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EXAMINER	
HANNAHER, CONSTANTINE	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 11/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/658,042	GUO ET AL.	
	Examiner	Art Unit	
	Constantine Hannaher	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-73* is/are pending in the application.

4a) Of the above claim(s) *33-35 and 68-70* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32,36-67 and 71-73* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-73* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *20040211*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 33-35 and 68-70 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on September 19, 2005.

2. The identification of claims 17-22, 25-27, 34, 35, 55, 57, 58, 69, and 70 as "generic" is disputed. Each one of these claims recites limitations disclosed for a first species but not for a second species. MPEP § 806.04(f).

Information Disclosure Statement

3. Where the IDS citations are submitted but not described, the examiner is only responsible for cursorily reviewing the references. The initials of the examiner on the PTO-1449 indicate only that degree of review unless the reference is either applied against the claims, or discussed by the examiner as pertinent art of interest, in a subsequent office action. See Guidelines for Reexamination of Cases in View of *In re Portola Packaging, Inc.*, 110 F.3d 786, 42 USPQ2d 1295 (Fed. Cir. 1997), 64 FR at 15347, 1223 Off. Gaz. Pat. Office at 125 (response to comment 6). Consideration by the examiner of the information submitted in an IDS means that the examiner will consider the documents in the same manner as other documents in Office search files are considered by the examiner while conducting a search of the prior art in a proper field of search. The initials of the examiner placed adjacent to the citations on the PTO-1449 or PTO/SB/08A and 08B or its equivalent mean that the information has been considered by the examiner to the extent noted above. MPEP § 609 (Eighth Edition, August 2001).

Specification

4. Section 608.01 of the MPEP states in part:

> In order to minimize the necessity in the future for converting dimensions... to the metric system of measurements when using printed patents... all patent applicants should use the metric (S.I.) units followed by the equivalent English units when describing their inventions....

The Assistant Secretary and Commissioner of Patents and Trademark strongly reiterated and emphasized strong encouragement for patent applicants to use the metric system in patent applications in a message appearing at 1135 O.G. 55 dated February 18, 1992. At some future time, the USPTO will consider making it a requirement.

Note the use of the micron and the angstrom. The Examiner is unable to require the use of SI units.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-32 and 36-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not describe the location of an infrared sensitive component on the diaphragm and the specification does not describe the infrared sensitive component above the diaphragm, such that one skilled in the art is not able to make the invention.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 64, 65, 72, and 73 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 64 recites the limitation "a wafer adhesion layer on said wafer" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 45 does not establish a wafer.

Claim 72 recites the limitation "said etching step" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 45 does not establish an etching step.

The balance of the claims is rejected on the basis of their dependence.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1-8, 10-12, 14, 15, 17, 27, 32, 36, 39, 40, 41, 42, and 43 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Bly (US004959546A).

With respect to independent claims 1, 40, 41, 42, and 43, Bly discloses a detector **19** (Fig. **1**) comprising a base **20** having a recess formed therein, a diaphragm **19***a* generally extending across the recess, and an infrared sensitive component **19***e* supported by the diaphragm. The diaphragm **19***a* in the detector of Bly includes a material (column 2, lines 26-27) of the recited type in view of the identity thereof.

With respect to dependent claims 2-8, 14, and 39, the diaphragm **19***a* in the detector of Bly is a material (column 2, lines 26-27) of the recited type in view of the identity thereof.

With respect to dependent claim 10, the diaphragm **19***a* in the detector of Bly includes parylene.

With respect to dependent claim 11, the diaphragm **19***a* in the detector of Bly has a thickness in the recited range (column 2, line 25-26).

With respect to dependent claim 12, the diaphragm **19***a* in the detector of Bly has a surface area in a range which overlaps the recited range (column 3, line 4).

With respect to dependent claim 15, the diaphragm **19***a* in the detector of Bly is located as recited (Fig. **1**).

With respect to dependent claim 17, the infrared sensitive component **19***e* in the detector of Bly includes at least one property of the recited type (column 2, lines 29-30) and the variation in the index of refraction can be sensed by instrumentation (column 3, lines 34-50).

With respect to dependent claim 27, the detector of Bly further includes an infrared radiation absorbing material **19***b*.

With respect to dependent claim 32, the detector **19** of Bly is of the recited type.

With respect to dependent claim 36, the infrared sensitive component **19***e* in the detector of Bly is separated from the diaphragm **19***a* by at least one material **19***d* between them.

11. Claims 45-49, 62, 50-56, 58, 67, and 71 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Verhaegen (US006380605B1).

With respect to independent claim 45, Verhaegen discloses a method for forming a detector corresponding to the illustration in Fig. **5** which comprises the steps of providing a base **51**, forming or locating an infrared sensitive component **54** on the base, forming or locating a diaphragm **55** on or over the infrared sensitive component, and removing at least part of the base to form a recess (Fig. **5f**) such that the recess is located below at least part of the infrared sensitive component.

With respect to dependent claim 46, the removing step in the method of Verhaegen includes the removal of substantially all of the base **51** located as recited (Fig. **5f**).

With respect to dependent claims 47-49, 62, 50-52, and 71, the material of the diaphragm **55** in the method of Verhaegen has the recited properties in view of the identity thereof (column 11, line 25).

With respect to dependent claim 53, the thickness of the diaphragm **55** formed in the method of Verhaegen is within the claimed range (column 11, line 18).

With respect to dependent claim 54, the removing step in the method of Verhaegen is as recited (Fig. **5f**).

With respect to dependent claim 55, the infrared sensitive component **54** in the method of Verhaegen includes a thermopile (column 11, lines 11-15).

With respect to dependent claim 56, the first forming or locating step in the method of Verhaegen is as recited (see column 11, lines 11-15 for the plurality of thermocouples and column 11, lines 27-33 for the utterly standard pair of legs with Seebeck coefficients of opposite value).

With respect to dependent claim 58, the infrared sensitive component **54** in the method of Verhaegen includes polysilicon (column 11, line 12).

With respect to dependent claim 67, the detector formed by the method of Verhaegen is as recited.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary

skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 13, 28, 30, 31, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bly (US004959546A).

With respect to dependent claims 13 and 28, although Bly does not identify the base **20** or its thermal conductivity, it does not take more than ordinary skill in the art to understand that a thermal conductivity for diaphragm **19***a* which is at least one-tenth that for the base is useful for maintaining sensitivity to incoming infrared radiation by reducing diffusion of the thermal energy. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector of Bly such that the thermal conductivity of the base **20** was in the claimed range.

With respect to dependent claims 30 and 37, it would have been obvious to one of ordinary skill in the art at the time the invention was made to consider the one material layer **19***d* in the detector of Bly as an adhesive layer to improve the adhesion of infrared sensitive component **19***e* to the diaphragm **19***a* since nothing else connects the two layers.

With respect to dependent claim 31, the material layer **19***d* in the detector of Bly is a bright reflective metal (column 2, line 28). It would have been obvious to one of ordinary skill in the art at

the time the invention was made to identify the recited bright reflective metals as the metal for layer **19***d* in the detector of Bly since Bly is not limiting ("...a metal such as...") and their properties are well known.

15. Claims 57 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verhaegen (US006380605B1).

With respect to dependent claim 57, the recited alloys are utterly well known for the purpose of manufacturing a thermopile. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method for forming a detector suggested by Verhaegen such that known alloys were used for the infrared sensitive component.

With respect to dependent claim 64, as best understood, the method of Verhaegen further includes the step of forming or locating a layer **53** which serves as a "wafer" adhesion layer since nothing else connects "wafer" (base **51**) with the infrared sensitive component **54**.

16. Claims 9, 16, 18, 19, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bly (US004959546A) in view of Verhaegen (US006380605B1).

With respect to dependent claim 9, the diaphragm material in the detector of Bly may be one of a plurality of materials (column 2, lines 26-27) but benzocyclobutene is not in the list. Verhaegen shows that benzocyclobutene is a known material for layer which extends across a recess and supports an infrared sensitive component. In view of that suitability and the compatibility with aluminum as described by Verhaegen, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector of Bly such that diaphragm **19***a* was of a material including benzocyclobutene.

With respect to dependent claim 16, the infrared sensitive component in the detector of Bly does not extend to any part of the diaphragm **19***a* which is not located above the recess. Verhaegen

shows that an infrared sensitive component which does so extend may be supported across a recess by a diaphragm. In view of the advantages in employing an infrared sensitive component as described by Verhaegen (column 2, lines 10-12), it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector of Bly such that the infrared sensitive component **19***e* extended to a part of the diaphragm **19***a* which was no located above the recess.

With respect to dependent claim 18, the infrared detector of Bly does not generate an electrical signal. Verhaegen shows that an infrared sensitive component which generates an electrical signal may be supported across a recess by a diaphragm. In view of the reduced optical complexity in sensing an electrical signal by instrumentation rather than a change in the refraction, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector of Bly such that the infrared sensitive component **19***a* generated an electrical signal which could be sensed by instrumentation.

With respect to dependent claim 19, the infrared detector of Bly does not include a thermopile. Verhaegen shows that an infrared sensitive component which includes a thermopile may be supported across a recess by a diaphragm. In view of the reduced optical complexity in sensing infrared radiation using a thermopile rather than a change in the refraction, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector of Bly such that the infrared sensitive component **19***a* included a thermopile.

With respect to dependent claim 25, the recited alloys are utterly well known for the purpose of manufacturing a thermopile. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector suggested by Bly and Verhaegen to make use of known alloys for the infrared sensitive component.

With respect to dependent claim 26, the infrared sensitive component **54** suggested by Verhaegen includes polysilicon (column 11, line 12).

17. Claims 19-26, 29, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bly (US004959546A) in view of Endo *et al.* (US006348650B1).

With respect to dependent claim 19, the infrared detector of Bly does not include a thermopile. Endo *et al.* shows that an infrared sensitive component which includes a thermopile may be supported across a recess by a diaphragm. In view of the reduced optical complexity in sensing infrared radiation using a thermopile rather than a change in the refraction, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector of Bly such that the infrared sensitive component **19***a* included a thermopile.

With respect to dependent claim 20, the pitch of the thermopile suggested by Endo *et al.* is a construction detail within the ordinary skill in the art in view of such concerns as ruggedness, resolution, and the like.

With respect to dependent claims 21 and 22, a dictionary definition of what constitutes a thermopile is so well known as to require no citation, Endo *et al.* confirms. See, for example, column 14, lines 6-8.

With respect to dependent claims 23 and 24, output pads **12** of the type recited are shown by Endo *et al.*

With respect to dependent claim 25, the recited alloys are utterly well known for the purpose of manufacturing a thermopile. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector suggested by Bly and Endo *et al.* to make use of known alloys for the infrared sensitive component.

With respect to dependent claim 26, the infrared sensitive component suggested by Endo *et al.* includes polysilicon.

With respect to dependent claim 29, the base **1** suggested by Endo *et al.* has a thickness in the claimed range (column 16, lines 64-66). It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify a thickness in the claimed range for the base **20** in the detector of Bly in view of the miniaturized chip size attainable thereby.

With respect to dependent claim 38, a passivation layer (column 14, line 16) is suggested by Endo *et al.* In view of the improved sensitivity described by Endo *et al.* (column 27, lines 54-61) it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector of Bly *et al.* to further include a passivation layer.

18. Claims 59-61, 63, 72, and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verhaegen (US006380605B1) in view of Endo *et al.* (US006348650B1).

With respect to dependent claim 59, output pads **12** of the type recited are shown by Endo *et al.* Such output pads are a normal part of an infrared sensitive component and the method of Verhaegen simply omits what is well known. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Verhaegen to further include the step of forming or locating at least one output pad.

With respect to dependent claim 60, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide whatever manner of access to the formed or located output pad as was necessary. In view of the complete coverage of the base by the diaphragm in the method of Verhaegen, a further step of etching the diaphragm to expose an output pad would have been obvious.

With respect to dependent claim 61, Endo *et al.* suggests the step of depositing an infrared absorbing material one at least one side of the diaphragm (column 14, lines 16-17). In view of the improved absorption of infrared energy, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Verhaegen to further include such a step of depositing.

With respect to dependent claim 63, the base **1** suggested by Endo *et al.* has a thickness in the claimed range (column 16, lines 64-66). It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify a thickness in the claimed range for the base **51** in the method of Verhaegen in view of the miniaturized chip size attainable thereby.

With respect to dependent claim 72, as best understood, the base in the method of Verhaegen includes a passivation layer **53** (compare the layer **53** of Verhaegen, column 10, lines 26-38, with the layer **8** of Endo *et al.*, column 17, lines 50-63) and any etching step in the disclosed method exposes the passivation layer (Fig. **5f**).

With respect to dependent claim 73, Verhaegen suggests that the layer **53** may, to some extent, be omitted, so it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Verhaegen to remove the exposed passivation layer **53** since the diaphragm **55** is in place to support the infrared sensitive component.

19. Claims 65 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verhaegen (US006380605B1) in view of Gerber *et al.* (US005087312A).

With respect to dependent claim 65, Gerber *et al.* identifies chromium as a known adhesion layer between a dielectric **7** and metal elements **1, 2, 3** (Fig. **5** and column 3, lines 24-36). In view of the improved performance of an infrared sensitive thermopile as suggested by Gerber *et al.* by the promotion of adhesion between thermocouple elements and a support therefor, it would have been

obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Verhaegen such that layer **53** was, or included, chromium.

With respect to dependent claim 66, Gerber *et al.* discloses that an adhesion layer between a dielectric **7** and metal elements **1, 2, 3** (Fig. **5** and column 3, lines 24-36) are known. In view of the improved performance of an infrared sensitive thermopile as suggested by Gerber *et al.* by the promotion of adhesion between thermocouple elements and a support therefor, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Verhaegen such that a diaphragm adhesion layer was formed or located between the infrared sensitive component **54** and the diaphragm **55**.

Response to Submission(s)

20. This application has been published as US2004/0113076A1 on June 17, 2004.

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Constantine Hannaher whose telephone number is (571) 272-2437. The examiner can normally be reached on Monday-Friday with flexible hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov/. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ch

Constantine Hannaher
Primary Examiner